Case Study - Bosun Robust Block

Valley Hyper Shopping Centre - Nelspruit

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Project Overview

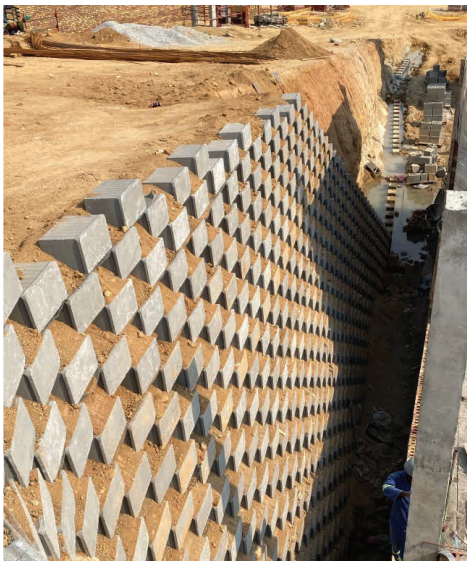
Project & Location	-	Valley Hyper Shopping Centre, Nelspruit
Product	-	Bosun Robust Block
Wall Area	-	2534m^2
Wall Height	-	4.5m
Wall Angle	-	80 Degrees
Engineer	-	Jones and Wagener / Edilcon
Contractor	-	Joubert en Seuns
Specialised Retaining Wall Contractor	-	Engineered Interlock Solutions
Completion Date	-	July 2020

Every construction project has its own set of challenges, such as time and budget demands. However, when working on a project with tight space constraints, and excessive ground water, there are additional challenges to overcome.

The Valley Hyper Shopping Centre development required the design and construction of three retaining walls along the perimeter of the development – each posing their own challenges.

The biggest challenge faced during both the design and construction phase was the excessive groundwater present on site. From the beginning there were groundwater issues - during the initial earthworks phase of the development, approximately 1800 litres of water were drained per day without signs of submission. It became apparent that the wall design would have to incorporate innovative blanket drain systems to prevent the high groundwater from reaching and affecting the retained soils and to ensure the structural integrity of the wall.

The blanket drains consisted of 19mm stone, wrapped with A2 Bidim. The drain outlets were positioned out of sight below ground level, over the retaining wall foundation and directed the water into the stormwater systems.



As the commercial development was intended to maximise usable land space, another challenge was to specify a retaining wall block that could help achieve this and to perform well within the tight space constraints, both in front and behind the wall. With access roads and the commercial structures being in such close proximity, a wall of no less than 80-degrees was required. At certain extremities, the distance between the building and the walls came to distances of only 600mm. In areas, available tie back was limited to less than 25% of the wall height. The walls would also have to factor in the additional surcharge load from the adjacent access roads.

The Bosun Robust block was considered as it can be used to construct 80-degree walls due to its specially designed nib. The nib provides excellent horizontal shear resistance to assist with the horizontal forces exerted by the retained soil. In addition to the nibs, the Robust Block features a V-shaped stiffener which provides better load distribution, especially when there are additional surcharge loads from vehicles or buildings.

The combination of the well-designed nib and V-shaped stiffeners provided the designer with a more structurally sound wall even with minimal tie back. With wall heights in excess of 4 metres and with less than 25% tieback, the Robust Block became the preferred choice.

In an open laying pattern, 5.1 Robust blocks are used per m², which makes this block a cost-effective solution for designers. Another advantage is that the manufacturer guarantees the height of the block to be within a tolerance of 0.5mm, which simplifies the installation considerably. This consistency in block heights brings about further savings on site.

Wall details:

Wall 1 - Cut wall:
- Length - 340m long
- Average height - 4.5m
- Area – 1530m²
- Geogrid - 40kn geogrid every second row at 25% tie back
- Stabilisation - 4% cement stabilisation.

Wall 2 - Cut Wall:
- Length – 135m
- Average height – 4.1m
- Area – 554m²
- Geogrid - 40kn geogrid every second row at 25% tie back.
- Stabilisation - 4% cement stabilisation.

Wall 3 - Fill Wall:
- Length - 222m
- Average height – 2m
- Area 450m²
- Geogrid - 40kn geogrid every second row at 60% tie back.